Environmental Science and Policy 89 (2018) 421–429

Contents lists available at ScienceDirect

Environmental Science and Policy

journal homepage: www.elsevier.com/locate/envsci

Not in my back yard: Egocentrism and climate change skepticism across the globe

Brett W. Pelham

Montgomery College, 20200 Observation Drive, Germantown, MD 20876, United States

ARTICLE INFO

Keywords:
Climate
Climate change
Culture
Global warming
Public opinion

ABSTRACT

Unusually warm or cool weather has a short-term influence on public opinion of "global warming." This paper extends this idea by showing that both regional *climate* (average long-term temperature) and seasonal variation in average temperature predict variation in public skepticism about global warming. Analyses of both polling data and Google search volume data show that in regions with colder climates (both U.S. states and nations), there is more public skepticism about global warming. The effects of climate remained even after controlling for regional confounds such as age, education, income, cultural values, and political attitudes. Follow-up analyses suggested that cold temperatures play a stronger role than hot temperatures in shaping public skepticism about global warming. A third study set focusing on four English-speaking nations suggested that seasonal variation in temperature is also predictably related to public skepticism about global warming. Public opinion about the reality of this specific aspect of climate change appears to be susceptible to egocentric biases such as memorial availability and construct accessibility. All else being equal, climate change educators will likely face more pushback about global warming in places with cold climates and at times of the year when the weather is cold.

1. Introduction

A great deal of evidence shows that human activity, especially greenhouse gas production, has changed the earth's climate (Lambeck et al., 2014; Oreskes, 2004; Solomon et al., 2009).This includes not only an average increase in global temperature but also phenomena such as shifting precipitation patterns and fewer but more severe hurricanes (Holland and Bruyère, 2014). Although there is strong scientific consensus about the reality of climate change, many laypeople are skeptical (Howe and Leiserowitz, 2013; Jones, 2014). A common skeptical belief is that climate change is happening but is not anthropogenic. In other words, it may have gotten a little warmer in the last century, but this warmth reflects natural variation rather than human despoliation. This form of skepticism became especially alarming in March of 2017 when Scott Pruitt, the newly appointed head of the U.S. Environmental Protection Agency publicly affirmed his own skeptical position on climate change (Davenport, 2017). About a year later, Pruitt went so far as to suggest that warming temperatures might be good for the planet (Stone, 2018).

Surprisingly, whether people endorse the idea of anthropogenic climate change varies with the current ambient temperature. Rather than maintaining stable beliefs about climate change based on scientific consensus, people are biased by whether they are currently hot or cold. Risen and Critcher (2011) asked participants to report their beliefs about climate change in a comfortable or a hot room. Those in the cooler room expressed more skepticism about the reality of "global warming." The same pattern occurred when the researchers made an excuse to take participants outside on fall days that ranged from cool (9.5 degrees C) to toasty (31.7 degrees C). Students expressed greater climate change skepticism on cooler days. Similarly, Zaval et al. (2014) found that when people felt that the weather where they lived had been cooler than usual lately, they were less likely to agree that the earth's climate is becoming warmer (see also Joireman et al., 2010). Perhaps the most definitive evidence that recent weather influences perceptions of global warming comes from Egan and Mullin (2012). These researchers collated recent temperature patterns and the attitudes about global warming reported by Americans in the 48 contiguous U.S. states. In zip codes where the recorded temperature had been much warmer than usual in the past week or so, survey respondents were more likely to agree that the earth's climate is gradually warming. Such studies show that superficial, egocentric judgments can trump rational judgments about climate change.

These findings are all consistent with a great deal of research in social cognition showing that human judges are highly *egocentric*. The term egocentric was popularized by Jean Piaget – who argued that young children are highly egocentric, trusting their own immediate

E-mail address: bpelham@montgomerycollege.edu.

https://doi.org/10.1016/j.envsci.2018.09.004
Received 11 December 2017; Received in revised form 9 September 2018; Accepted 10 September 2018
Available online 24 September 2018
1462-9011/ © 2018 Elsevier Ltd. All rights reserved.

perceptions rather than engaging in abstract perspective taking (Piaget and Inhelder, 1956). Although Piaget was surely correct that children are more egocentric than adults, modern research has revealed a myriad of ways in which even mature human adults remain highly egocentric (Epley et al., 2004; Kruger and Burrus, 2004). For example, Ross et al. (1977) demonstrated the false consensus effect. When people prefer or have done something, they overestimate the number of other people who prefer or have done that same thing. Human adults also have difficulty appreciating the fact that other people do not know what they happen to know (Pronin and Olivola, 2006). As yet another example of adult egocentrism, Bargh et al. (1988) showed that both temporarily-accessible and chronically-accessible mental constructs (ideas to which people happen to have been recently exposed) bias people's judgments of a stranger's personality (see also Williams and Bargh, 2008). Tina seems more introverted than usual when judges have recently been exposed to the concept of introversion. Research on the availability heuristic (Tversky and Kahneman, 1973) makes a very similar point. When making likelihood or frequency judgments, people strongly trust that which very easily comes to mind. Gilbert (1991) goes so far as to argue that the human brain is programmed by evolution to accept everything it experiences as real. In fact, Schuldt and Roh (2014) specifically argued (a) that experiencing colder than average weather reduces people's belief in "global warming" and (b) that this is due to accessibility (aka semantic priming). They showed that exposure to either a real spring snowfall or photos of snowy April weather reduced people's beliefs in "global warming" but had little effect on whether they believed in "climate change."

If recent cold weather temporarily increases skepticism about climate change, then *chronically* cold weather (regional climate) might chronically increase skepticism about climate change. Research on focalism (Wilson et al., 2000) further suggests that people might overweight their own chronic local experiences when making judgments about the planet. There is some indirect evidence that people's views of climate change might be biased by their own local climate. Akerlof et al. (2013) showed that residents in rural Alger County, Michigan were pretty good at remembering recent meteorological events (but cf. Niles and Mueller, 2016, who found that farmers in New Zealand were not so accurate). Akerlof et al. found that respondents' "personal experience of global warming" predicted a stronger perception that their county was at risk of harm due to global warming. This was true after controlling for competing predictors such as political party affiliation. Lee et al. (2015) also found that people who reported that their local temperature had recently been getting warmer were more likely to report believing in "global warming." Such beliefs might reflect a sensitivity to recent local temperature. But research also shows that beliefs about climate change can bias people's perceptions of recent weather events (Howe and Leiserowitz, 2013).

The present research examines both the long-term effect of *climate* and seasonal variation in average temperature on public opinion about climate change. Because climate change is happening at a rate of about 1/10 of a degree Celsius per decade, we concur with Kempton et al. (1996) that most people could not easily detect something so subtle. Instead, believing in climate change may often make people feel it is getting warmer where they live (Balcetis and Dunning, 2006; Hastorf and Cantril, 1954; Wason, 1960). In apparent contrast to the idea that climate influences attitudes about global warming, Egan and Mullin (2012, p. 803) argued that "attitudes on global warming shift as rapidly as the weather: isolated days of abnormally high or low temperatures *leave no permanent trace on public opinion* as they recede into the past" (emphasis added). This implies that local climate does not matter. However, Egan and Mullin based their conclusion on lags in short-term weather variation that stretched back only a few weeks. They did not assess – nor did they claim to assess – either local *climate* (e.g., average temperature over a long period) or seasonal variation in average temperature. Thus, past work has not examined important questions about whether either local climate or seasonal variation in temperature influence public opinion about climate change.

In addition to the physical atmosphere, the cultural atmosphere might also influence public opinion on climate change. After all, climate change is a social dilemma. The large SUV that helps Jason get around comfortably has a carbon footprint whose price is paid by everyone. Further, most of the specific costs of climate change represent threats to unspecified members of large social groups. For example, neither an increase in the severity of hurricanes nor rising sea levels pose direct threats to most Nebraskans. But both problems pose serious threats to Floridians. Likewise, the warmer summers and shorter winters that may prove nightmarish in Morocco may be welcome news in Siberia. People living in cool regions who think only of themselves may not be too worried about climate change.

If climate change is a social dilemma, then people from collectivistic cultures may be less skeptical than usual of the reality of climate change. Collectivism refers to a cultural orientation that emphasizes group needs and wishes over those of the individual. In most collectivistic cultures, people are expected to put family, community, and nation ahead of the self (Markus and Kitayama, 1991). To the degree that climate change threatens the long-term survival of one's family or nation, collectivists might consider climate change more worrisome. As long as the members of collectivistic cultures are dealing with fellow ingroup members, they appear to be more cooperative than people from individualistic cultures (e.g., see Earley, 1993; Parks and Vu, 1994; but cf. Probst et al., 1999). The tendency for people from collectivistic cultures to care deeply about ingroup members appears to be highly overlearned (Hetts et al., 1999).

In addition to studying collectivism for its own sake, it is important to control for this cultural variable as a potential confound in any cross-regional study focusing on public perceptions of global warming. Warmer regions tend to be more collectivistic than cooler regions. The most collectivistic U.S. state, for example, is Hawaii, which is also the warmest (Vandello and Cohen, 1999). Warmer states and regions also tend to have high pathogen loads, which are strongly associated with collectivism (Fincher et al., 2008). Globally speaking, this means that most African nations are much more collectivistic than most European nations (Pelham et al., 2018). Thus, to assess whether a colder climate is associated with greater skepticism about global warming, one must control for collectivistic cultural attitudes. I tested this hypothesis in both a study of U.S. states and a study of nations across the globe.

2. Study 1: methods

Study 1 examined variation in public skepticism about climate change across the 50 U.S. states. To assess climate change skepticism, I harvested data from Google Correlate. This on-line research tool allows users to compare per capita internet search volumes across the 50 U.S. states (since January 2004) for almost any search term. The score for each U.S. state is a *z*-score that reveals how that state compares with all other U.S. states for the entire search window (January 2004–February 2017 for Study 1 of this report). To assess skepticism about climate change, I searched "global warming myth". The Google Correlate result file automatically included a list of other search terms that were highly correlated with this search phrase (as it does for any search). The two conceptually-relevant searches that proved to be most highly correlated with "global warming myth" were "global warming hoax" and "against global warming." I created a reliable indicator of state-by-state skepticism about global warming by averaging these three scores ($\alpha = .98$). There has been some debate about how well Google Correlate search volume scores predict what will happen in the future (Lazer et al., 2014). However, there is little debate about whether such scores capture past search activity. For example, Americans living in the cold state of Minnesota search for "mittens" at a much higher rate than Americans living in the warm state of Hawaii. If you want to know what Americans think about in different states, one way to find out is to see what they Google (Pelham et al., 2018; Stephens-Davidowitz, 2014).

Research on public attitudes about climate change suggests several confounds that could masquerade as effects of climate. In poorer states, states with fewer college graduates, and states with more Republican voters, one would expect more skepticism about anthropocentric climate change (see Krosnick et al., 2000; McCright and Dunlap, 2011). For example, only 7% of liberal Democrats but 51% of conservative Republicans report believing that there is no good evidence that the "average temperature on earth has been getting warmer" (Pew, 2012). This is methodologically worrisome because Alaska and North Dakota are both chilly and heavily Republican whereas California and Hawaii are both warm and heavily Democratic.

This report examined not only average temperature and collectivism but also variables – such as wealth and education – that could be confounded with climate or collectivism. In Study 1, I harvested median household income from the 2010 American Community Survey (ACS). I selected 2010 data because this year fell closest to the midpoint of the 2004–2017 Google Correlate search window. I also used 2010 Census data to calculate the percentage of college graduates per state. I harvested political party affiliation data from 2010 Gallup surveys of 350,000 Americans. Using these data, Jones (2011) reported the percentage of registered voters in each U.S. state who were either "Republican" or "Republican-leaning." I assessed the cultural variable of individualism-collectivism using Vandello and Cohen's (1999) well-validated measure. I also assessed the percentage of residents in each U.S. state who were 65 or older. The rationale for so doing was twofold. First, older Americans tend to be more politically conservative. Second, older Americans may recognize that it is unlikely they will be around to experience personally the long-term consequences of global warming. As actor Ed Asner described global warming when he was in his mid-80 s, "That's an *after I'm dead* problem!" I expected that, all else being equal, there might be more skepticism about global warming in states with a higher proportion of senior citizens. Returning to the main hypothesis, I also expected that, even after controlling for competing predictors, there would be more Google searches suggesting skepticism about global warming in colder U.S. states.

3. Study 1: results and discussion

To test my hypothesis, I conducted a simultaneous multiple regression in which I predicted the composite global warming skepticism score (range = $z = -1.52$–$z = 2.23$) across the 50 U.S. states from (a) median household income (range = $36,338-$68,080), (b) percentage college-educated residents (range = 15.3–36.7), (c) percentage registered voters who were, or leaned, Republican (range = 29.2–56.0), (d) the percentage of seniors (65 +) in each state (range = 9.5 to 19.1), (e) average state temperature (range = −3.0∘ C to 21.5∘ C), and (f) Vandello and Cohen's (1999) state by state measure of individualism. This model accounted for well over half of the state by state variation in searches suggesting skepticism about global warming (adjusted R-square = .58). Further, all the predictors in the model had good multivariate properties (e.g., all variance inflation factor (VIF) scores were less than 3.0, all variables had skewness scores with absolute values less than 1.0).

As shown in Fig. 1, the results of this regression analysis strongly supported the primary hypotheses. First, all else being equal, there was greater search activity suggesting skepticism of global warming in colder U.S. states. This was not a small effect ($\beta = -.53$, $t(43) = -3.66$, $p = .001$). The results also revealed that skepticism about global warming is greater in states with more Republicans ($\beta = .47$, $t(43) = 3.94$, $p < .001$). Given how large these two unique effects were, perhaps it is not surprising that none of the other predictors had significant unique effects. It is worth noting, however, that the zero-order association for the cultural variable of individualism was substantial ($r = .58$), but disappeared after controlling for political attitudes and average temperature.

The fact that these results confirm results observed using more traditional polling techniques attests to the validity of Google Correlate as an unobtrusive measure of public opinion. Just as polls show that Republicans tend to express skepticism about climate change relative to Democrats, people living in mostly Republican states tend to search Google more often for terms such as "climate change hoax." Although one must always be cautious about drawing causal conclusions from passive observational data, it is worth noting that the key findings for average temperature rule out five important competing predictors, including the powerful and well-known effect of political party affiliation. Further, the concerns about reverse causality that plague most passive observational studies do not apply here. It is not possible that public skepticism about global warming in North Dakota makes it cold there.

Would these primary results hold up for more traditional indicators of public opinion? To my knowledge, no one has tabulated complete state-by-state data on skepticism about climate change. However, Krosnick (2013) came pretty close. Krosnick used data from the General Social Survey to calculate state-by-state scores on many climate change issues. The question that comes closest to assessing skepticism about whether climate change is *real* is the question of whether people think "warming will continue in the future." (Note, however, that this question must be reverse-scored to indicate skepticism.) Krosnick was only able to create public opinion estimates for this question in the 36 most populous U.S. states. This is unfortunate because many very cold U.S. states are also sparsely populated states – for which there were no public opinion estimates. A small, very warm state, Hawaii, was also excluded. Nonetheless, to assess the validity of the Google Correlate skepticism measure, I correlated the Google search volume measure with Krosnick's public opinion estimates for the 36 states for which there were data. The correlation was sizable – and in the predicted direction, $r(34) = -.48$, $p = .003$. When I substituted this traditional measure of public opinion for the Google measure as the criterion in the primary regression analysis, the findings grew a bit noisier. The variance inflation factor for state education level now reached 5.48. In this supplemental analysis, there were three significant predictors at $p < .05$: average temperature, the percentage of college graduates by state, and the percentage of people aged 65 and older per state (the percentage of Republicans per state was also marginally significant, $p = .069$). All three variables predicted climate change skepticism in the expected direction. Given (a) the restriction of range for temperature in these 36 relatively populous states and (b) the decrease in power associated with a 28% reduction in sample size, it is not surprising that there was a great deal of instability in these results. In fact, a simple *t*-test confirmed that the 14 states for which there were no public opinion data had significantly colder climates than the remaining 36 states, $t(48) = 2.30$, $p = .026$. Finally, whereas Krosnick's survey results were based on hundreds of interviews per state, the Google Correlate search volume scores for all 50 states were based on many hundreds of thousands of searches per state, even in less populous states. On the whole, these results strongly support the primary hypothesis that local climate biases public opinion on climate change. Nonetheless, it would be useful to test the idea that living in a cold place makes people skeptical of global warming using a much larger set of geographical regions. It would also be useful to take a second look at culture. In the U.S., at least, the specific aspects of collectivism that make people more willing to sacrifice for the general good may be captured to a great degree by political party affiliation. So perhaps Study 1 did not give collectivism a fair shake.

4. Study 2: methods

Global warming is happening to the planet, not just to the 50 U.S. states that were the limited focus of Study 1. Would the findings of Study 1 hold up at a global level, using traditional polling techniques? Fortunately, the Gallup World Poll provides nationally representative public opinion data for most of the earth's population (Pelham, 2009). In fact, Lee et al. (2015) examined attitudes about global warming

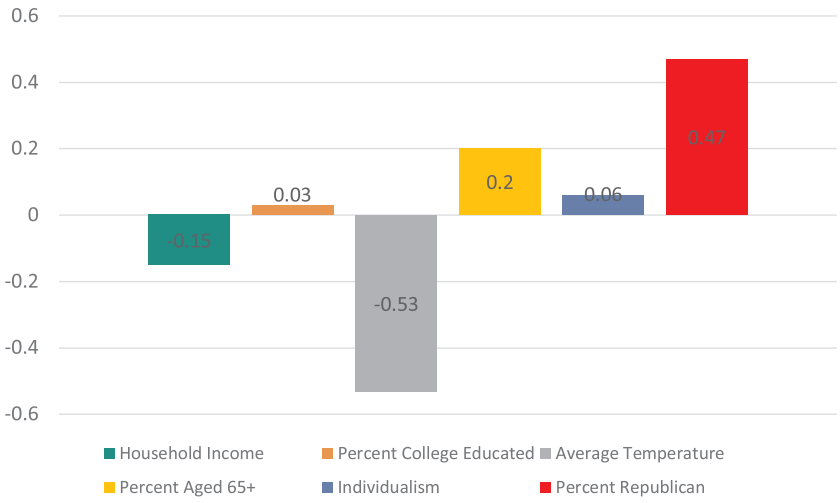

Fig. 1. Unique Predictors of Volume of Internet Searches Suggesting Skepticism about "Global Warming" across the 50 U.S. States. Note. Values are standardized regression coefficients from a simultaneous multiple regression analysis. For percentage Republicans and average temperature, both *ps* ≤ .001. For percentage of population aged 65+, $p = .096$.

across the globe. They showed that there was a great deal of variation across the globe in the within-nation predictors of concern about climate change. Their main conclusion regarding culture and climate change was that nation-level variables such as GDP and education were only weak predictors of public opinion on climate change. Being highly familiar the Gallup climate change data, I can confirm that this is correct for the specific indicators Lee et al. examined. However, Lee et al. did *not* examine either (a) climate (stable temperature differences across nations) or (b) collectivism as predictors of climate change attitudes.

Study 2 was a global replication of Study 1 that treated nations as the unit of analysis. I harvested public opinion data on skepticism about global warming by assessing the percentage of people in each of 127 nations who did *not* agree that "rising temperatures are … a result of human activity." Following Pelham (2009), Lazer et al. (2014) and Lee et al. (2015), I only obtained these scores for the subset of respondents in each nation who said they knew either "something" or "a great deal" about global warming. Figures ranged from a low of 8% skepticism in South Korea to 85% skepticism in Tajikistan. See Pelham (2009) for more details (http://www.gallup.com/poll/117772/awareness-opinions-global-warming-vary-worldwide.aspx). The other differences between Study 2 and Study 1 are that (a) I replaced state median household income with per capita GDP (purchasing power parity corrected), (b) I replaced college education rates with UNDP gross educational enrollment figures, (c) I dropped American political party affiliation (see Lee et al., 2015), and (d) I replaced the state-by-state measure of individualism-collectivism with Pelham et al.'s (2018) global measure of collectivism. Although other measures of individualism-collectivism exist (e.g., see Hofstede et al., 2010), these other measures cover only a small number of nations. Whereas the Hostede et al. measure covers only 69 nations, the Pelham et al. measure covers 195 nations. The Pelham et al. measure is also based on more highly representative national data than is any other existing measure. To get climate scores, I harvested 1961–1990 national average temperatures from public data provided by the Climatic Research Unit (see http://lebanese-economy-forum.com/wdi-gdf-advanced-data-display/show/EN-CLC-AVRT-C/). In short, I conducted a cross-national replication of the study of U.S. states by seeing whether average national temperatures predict cross-national variation in skepticism about global warming – even after controlling for most of the same competing predictors examined in Study 1.

5. Study 2: results and discussion

The primary simultaneous multiple regression analysis for Study 2 revealed that the five predictors accounted for a little less than a quarter of the variance in cross-national attitudes about whether global warming is the result of human activity (adjusted R-square = .22, $p < .001$). Given Lee et al.'s (2015) findings that cross-national predictors of attitudes about climate change were generally weak, perhaps this modest R-square value is to be expected. One might also expect to see only a modest association between national average temperature and skepticism about global warming in a nation by nation analysis – because many nations have a very wide range of climates. There is much more variation in average temperature across India than across Indiana. In fact, the global median land area of a nation (in square kilometers) is almost 10 times the median land area of U.S. states. All this being said, the variables in the main model in Study 2 had good multivariate properties. With the exception of GDP (skew = 1.63, kurtosis = 2.54), all variables had skew and kurtosis scores with absolute values less than 1.0. The closest thing to a multivariate problem variable was the percentage of the population aged 65 and older, for which the variance inflation factor was 3.52 (still well below 10.0).

As shown in Fig. 2, in the sample of 117 nations, there were only two significant unique predictors of public skepticism about global warming. First, climate (national average temperature) was a strong unique predictor ($\beta = -.56$, $t\ (115) = -4.80$, $p < .001$). All else being equal, people who live in colder nations are more skeptical of global warming. I should note that in Study 2, the zero-order correlation between average temperature and skepticism about climate change was smaller than the standardized regression coefficient. This is because in very warm nations, variables such as GDP and educational enrollment rates are much lower than the global average (think Eritrea vs. Finland). This is a case of classical statistical suppression, and it masked the zero-order association between cold temperatures and attitudes about global warming. In Study 2, the percentage of the population aged 65 and older was also a reliable predictor of public skepticism about global warming ($\beta = -.46$, $t\ (115) = -2.67$, $p = .009$). However, in contrast to predictions, nations in which there were more seniors were *less* skeptical – not more so – of global warming. If this were a zero-order correlation, it might reflect the obvious fact that highly developed nations have a high proportion of senior citizens. But this was a unique effect. Along these general lines, GDP had a simple (negative) zero-order association with climate change skepticism, but this zero-order association disappeared after controlling for the other predictors. Why should nations with more seniors be more likely to believe in the reality of global warming? One possibility is that seniors have been around long enough to observe a greater number of meteorological events that are consistent with global warming. A more jaded interpretation is that in nations where many people can expect to die young, few adults worry about what the world will be like in 50 years. Having said all this, it is not clear why the percentage of seniors

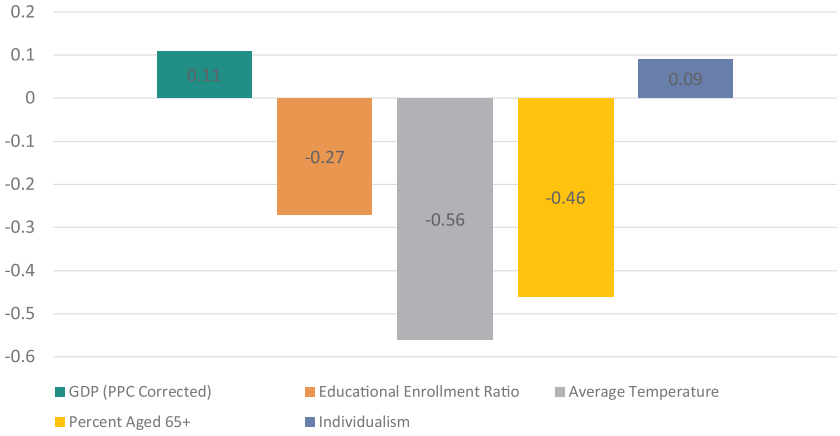

Fig. 2. Unique Predictors of Public Skepticism about "Global Warming" (Gallup World Poll) across 117 Nations. Note. Values are standardized regression coefficients from a simultaneous multiple regression analysis. For educational enrollment, $p = .090$; for average temperature, $p < .001$; for percent population aged 65 +, $p = .009$.

living in a global region would have a different unique association with skepticism about global warming than the percentage of seniors living in a U.S. state. If nothing else, the results of Study 2 serve as a cautionary tale about trusting that all the results based on any single nation will apply consistently across the globe.

Study 2 also revealed a marginally significant association ($p = .090$) between gross educational enrollment ratios and skepticism about global warming (such that there was less skepticism about global warming in nations with higher educational enrollments). Another difference between Study 2 and Study 1 is that Study 1 provided at least some evidence that collectivism is associated with lower levels of skepticism about global warming. There was no such evidence in Study 2. Whatever the reasons behind the differences between Study 1 and Study 2, the most important finding of Study 2 is that even after controlling for every other reasonable predictor for which data were available, national average temperature is a reliable unique predictor of skepticism about global warming.

6. Separating effects of hot and cold temperatures

An astute reviewer of this report suggested analyses that could yield additional insights into the association between regional temperature and public skepticism about global warming. Exactly what temperature-based cues do most people use to evaluate the reality of global warming? Do hot days reduce skepticism about global warming? Or do cold days increase such skepticism? I addressed this question in both the U.S. state by state data and the global cross-national data. Beginning with the U.S. data, I harvested data on the average number of (a) very hot days (days in which the high temperature was 90 °F or warmer) and (b) very cold days (days in which the low was 32 °F or lower). These data are available for 254 U.S. cities at https://www.ncdc.noaa.gov/ghcn/comparative-climatic-data. It is worth noting that NOAA provides many more data points (more cities) for geographically large than for geographically small U.S. states. I used data from all available cities in all U.S. states, weighing each city within each state by its 2010–2015 population. This yielded a population-sensitive index of the average number of very hot and very cold days for each U.S. state. In Arizona, for example, the data for Phoenix were given much greater weight than the data for Winslow. I then repeated the primary multiple regression analysis for Study 1 after adding two new predictors: both (a) the average annual number of very hot days per state and (b) the average annual number of very cold days per state. These results were clear. The number of cold days won the day. The original adjusted R-square value increased modestly from .58 to .63. Further, the previously strong unique association between average state temperature and skepticism about global warming disappeared ($\beta = .01$). More important, the average number of very cold days per state was a strong positive unique predictor of skepticism about global warming ($\beta = .56$, $p = .016$). The number of very hot days did *not* predict such skepticism ($\beta = -.04$).

To assess the separate impact of hot versus cold temperatures in the global data, I adopted two separate approaches. First, I harvested Van de Vliert's (2013a, 2013b) nation by nation ratings for both heat demand and cold demand. Although these separate indicators of climatic demand have proven to be very useful, these heat demand scores and cold demand scores are based on the frequency of deviations from the ideal human temperature of 22 degrees C. A nation can thus have a high cold demand score because of many cool days rather than many freezing days. In light of this concern, I also located data on much more extreme temperature variations for many cities across the globe. The site providing these data is "timeanddate" (https://www.timeanddate.com/weather/). In the interest of expediency, I identified the official capital of all nations for which there were temperature data in Study 2. Using the national capital as a proxy for the nation, I then harvested data for (a) the number of months out of 12 in which the average low temperature was 32 °F or colder and (b) the number of months out of 12 in which the average high temperature was 90 °F or warmer. For most capital cities, the data covered a 31-year window (1985–2015). Of course, getting data from a single city per nation is less than ideal. However, the fact that highly populous, centrally located cities are overrepresented as national capitals reduces this concern. It is also worth noting that this second measure is more conceptually similar to the extreme temperature measures used in Study 1. These two different indicators of hot versus cold temperatures were highly correlated. Van de Vliert's measure of cold demands correlated $r(168) = .78$ with the number of very cold months in each nation's capital city. Likewise, Van de Vliert's measure of heat demands correlated $r(168) = .66$ with the number of very hot months in each nation's capital city. However, there was a problem with each of the two measures of cold temperatures. Each was very highly correlated with the measure of average temperature. In fact, for the measure of cold demands, this correlation was $r = .91$, indicating multicollinearity.

In light of this statistical problem, and in keeping with the goal of conceptually separating the effects of heat and cold, I conducted two supplemental analysis, one for the measure of temperature extremes and one for the measure of heat and cold demands. In each analysis, I simply replaced the original measure of average national temperature with both a measure of heat stress and a measure of cold stress. Fortunately, the separate measures of hot and cold temperatures were *not* so strongly correlated with one another as to create worries about multicollinearity ($rs = -.57$ and $-.31$). The analysis based on the capital city temperature extremes yielded a clear and significant effect of the number of cold months ($\beta = .37$, $p < .001$). In contrast, it yielded no effect of the number of hot months ($\beta = .03$, $p = .751$). The analysis based on heat and cold demands yielded very similar findings. There was a clear and significant effect of cold demands ($\beta = .55$, $p < .001$) and no effect of heat demands ($\beta = .04$, $p = .710$). Taken

together with the supplemental results of Study 1, these supplemental results strongly suggest that when it comes to public skepticism about global warming, exposure to cold probably has more psychological significance than exposure to heat.

7. Study set 3: methods

In contrast to past studies that have revealed only short-term effects of recent local temperature on beliefs about global warming, Studies 1 and 2 suggest that long-term climatic variation in local temperature influences public opinion about global warming. But in many nations, temperatures vary dramatically across the seasons. In places with highly variable weather (e.g., in places with continental climates), seasonal as well as geographic variation in temperature might be associated with changes in public opinion about global warming. To test this hypothesis, Study Set 3 used the same Google Correlate research tool used in Study 1 – to examine *seasonal* rather than *regional* variation in public opinion on global warming. Study 3a focused on the United States. In this study, I harvested data on the same three-item index of public skepticism of global warming examined in Study 1 (based on Google searches for "global warming myth," "global warming hoax," and "against global warming"). However, rather than tabulating data separately for the 50 U.S. states averaged over time, I harvested average weekly scores for the entire United States (incidentally, it is not possible to harvest weekly data *within* a given U.S. state). Doing this yielded 689 global warming skepticism scores for weekly windows beginning January 4, 2004 and ending March 12, 2017. I then coded the 689 weekly data points for month and conducted a curvilinear regression analysis in which I predicted average global warming skepticism scores from month of the year (coded 1–12). If skepticism about global warming rises in the coldest months of the year and then drops in the warmest months, this cyclical pattern would be reflected in a cubic curvilinear effect. If the effect of cold weather is larger than the effect of hot weather, the winter increase in skepticism about global warming might also be larger than the summer decrease in skepticism. To see if any observed patterns in the U.S. data were reliable, I replicated Study 3a in both Canada and the United Kingdom (Studies 3b and 3c). In both nations, I began by searching for "global warming myth." I then identified any other highly correlated hits that suggested skepticism about global warming. In the U.K. data, the additional hits that qualified using this rule were "global warming hoax" and "global warming conspiracy." In Canada, the search yielded only two hits, "global warming myth" and "global warming hoax." Finally, to see if this pattern would change in the Southern hemisphere, I attempted to replicate these effects in Australia and New Zealand. The search for New Zealand yielded no hits at all. The search for Australia (Study 3d) yielded hits for "global warming myth" and "global warming hoax." For all nations, I created a composite indicator of global warming skepticism that included all the measures that were available. This approach has two methodological strengths. First, there is no need to control for factors such as education, wealth, age, or political attitudes. This is because such variables do not vary seasonally. Second, because Australia is in the Southern hemisphere, any confounds between seasonal temperature variation and specific months or holidays will be reversed for Australia. This is important because it is conceivable that the vivid imagery that is associated with Christmas (e.g., manger scenes, Christmas cards, photos of snow scenes) might contribute to public skepticism about global warming. In Australia, this imagery increases in prominence in the beginning of summer rather than the beginning of winter.

8. Study set 3: results

As shown in the top two panels of Fig. 3, there was a modest amount of seasonal variation in skepticism about global warming in both the United States and Canada. Beginning with the U.S. data, the cubic function term was small but significant (equivalent adjusted R-squared = .045, $p < .001$, and this was true whether the analysis did or did not include linear and quadratic terms along with the cubic term). Further the lowest volume of Google searches suggesting skepticism about global warming occurred in August (predicted skepticism score = −0.25), at the end of the meteorological summer. Conversely, the highest level of Google searches suggesting skepticism about global warming (+0.35) occurred in December, at the beginning of the meteorological winter. The results for Canada were also modest but strikingly similar to those observed for the United States (equivalent adjusted R-squared = .040, $p < .001$, regardless of whether linear and quadratic terms were included in the model). In fact, as was the case in the U.S. data, the Canadian data showed that Google searches suggesting skepticism about global warming peaked in December (+0.38) and were at a minimum in August (-0.24). In the language of the Köppen–Geiger climate classification system, the climate in much of the United States and Canada is continental, which means there is a great deal of seasonal variation in average temperature. In contrast, most of the U.K. has a milder oceanic climate, which makes for less dramatic seasonal temperature variations. With this in mind, it is not surprising that the seasonal variation in skepticism about global warming was more modest in the U.K. than in the U.S. and Canada (equivalent adjusted R-squared = .018, $p = .006$). This is revealed in the lower left quadrant of Fig. 3, which is a flattened version of the pattern for the U.S. and Canada.

Despite this predictable national difference in overall effect size, residents of the U.K., much like their North American counterparts, expressed the greatest amount of skepticism about global warming in December (+.023) and expressed the least in August (−0.20) and September (−0.21). Given that much of Australia has a desert or humid subtropical climate, it makes sense that there was no significant seasonal variation in skepticism about global warming in Australia ($p = .140$). Finally, careful readers will have noticed that, especially in the United States and Canada, the December increase in skepticism about global warming (average deviation = +0.37) was about 50% larger than the average August decrease in skepticism about global warming (average deviation = −0.25). This is at least loosely consistent with the idea that cold temperatures may increase skepticism about global warming more than hot temperatures decrease it. Finally, researchers concerned with the degrees of freedom problem associated with having 689 correlated observations in these studies might be reassured to know that these effects were robust when analyzed using much simpler statistical approaches. In an alternate set of analyses, I dummy coded the spring and fall months as zero while coding the summer months as -1 and the winter months as +1. The correlations between these 12 dummy codes and the 12 average monthly public skepticism scores were $r(10) = .80$ in the U.S. data, $r(10) = .82$ in the Canadian data, and $r(10) = .67$ in the U.K. data (all $ps < .05$). The comparable correlation in the Australian data was $r(10) = .06$, n.s. (with appropriate reversals of the dummy codes).

9. General discussion

These three studies suggest that people base important judgments about climate change on information they ought to disregard. The fact that mountains are cooler than deserts does not in any way invalidate the mountains of evidence attesting to the reality of global warming. But human judges appear to be highly egocentric, concluding that their own backyards ("We sure have gotten a lot of snow lately.") are good proxies for the entire planet. In keeping with this view of human beings as highly egocentric and intuitive, van der Linden et al. (2015c) argue that climate change educators must come to grips with the fact that "the human brain privileges experience over analysis" (p. 759). This suggests, for example, that getting people to commit to long-term green behaviors (e.g., investing in solar panels) might be easier during the warmest months of the year rather than in the depths of the winter. Persuading laypeople to acknowledge and act on what virtually all

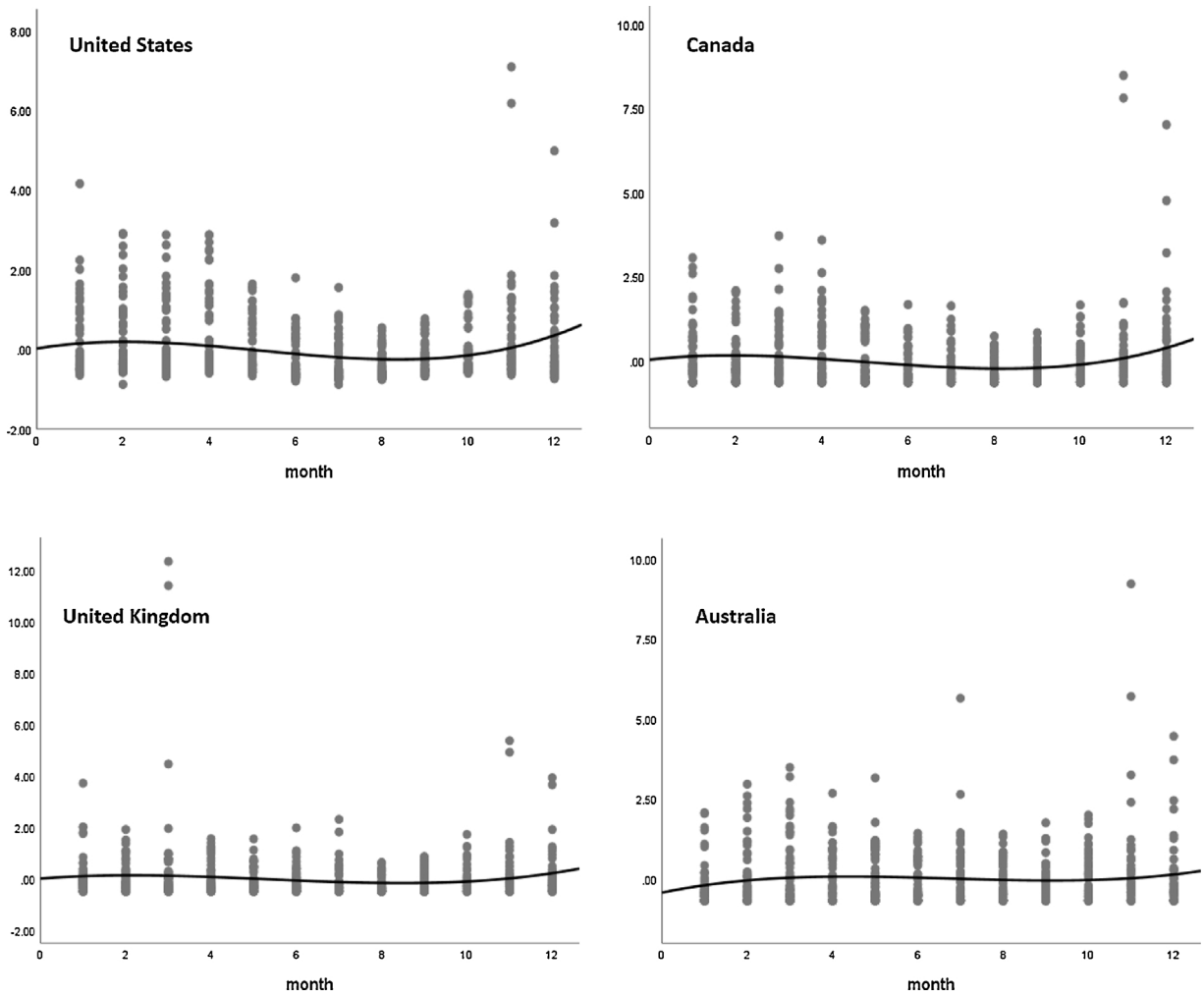

Fig. 3. Seasonal variation (or the lack thereof) in skepticism about global warming in four English-speaking nations.

scientists accept as fact thus requires a solid understanding of psychological as well as meteorological science. We cannot make much progress in reversing climate change unless we make progress in understanding human social cognition.

Along these lines, one of the most important findings of Studies 1 and 2 is that when it comes to public skepticism about global warming, local temperature appears to be more important than better-known predictors such as average education level. We already know that high education levels alone do not guarantee that people will acknowledge the reality of climate change. Scott Pruitt, for example, is highly educated. Future studies should focus on whether the local temperature is more strongly associated with attitudes about climate change for some people than for others. It is possible, for example, that those who are not very personally invested in the issue of climate change might be more likely to change their attitudes with changes in the weather. Future studies should directly address this question. Having said that, supplemental analyses of the data reported here revealed that high levels of public education do not, in and of themselves, inoculate the public from the temperature-skepticism effects documented here. In both the study of U.S. states and the global study, the association between temperature and skepticism about global warming was just as robust in regions where most people were highly educated as it was in regions where education levels were much lower.

There are many aspects of social cognition that influence public opinion about climate change. Unlike artificial intelligence systems, human minds have evolved to engage in forms of self-regulation that, while adaptive on the whole, present some impediments to green behavior (Pelham et al., 2018). Rather than guaranteeing accurate decisions, many forms of self-regulation serve to maintain or protect people's existing beliefs (Swann, 1987; von Hippel and Trivers, 2011). For example, threatening people's self-concepts makes people more likely to stereotype others – and more likely to evaluate the self or ingroup members favorably (Jones et al., 2002, 2004; Fein and Spencer, 1997; Solomon et al., 2015). Unfortunately, self-regulation also influences pro-environmental behavior. Getting people to take one pro-environmental action sometimes *reduces* people's felt need to engage in a different pro-environmental action. Purchasing energy-efficient light bulbs, for example, can make people feel it is more acceptable to leave lights on when the lights are not needed (Herring, 2006). Further, those who are most likely to practice green behaviors such as recycling are also the most likely to take overseas vacations – replacing many small carbon footprints with one huge one (Barr and Prillwitz, 2011).

Skepticism about climate change has many causes. But the problem is surely exacerbated by the fact that people are egocentric (Epley et al., 2004; Sacchi et al., 2016). We did not evolve to consider the planet. Instead, natural section shaped human judges to operate at a local level (Stearns, 1992). We have been programmed by millions of years of evolution to pay much more attention to what is right in front of us than to consider what is happening in Maui or Mauritania (Tooby and Cosmides, 2015). To put this differently, we seem to be hard-wired to be geographically egocentric. Some of the biggest barriers to combating climate change thus exist in the human mind. In fact, one could level the criticism of egocentrism at a great deal of past research on climate change. With some notable exceptions (Egan and Mullin, 2012;

Kantenbacher et al., 2018; Lee et al., 2015) many previous studies of attitudes about climate change have focused on the beliefs of people living in one tiny patch of the planet (e.g., students at a particular college, farmers in a particular city in the midwestern U.S.). The present studies have their limitations, but a major strength is that they address attitudes about global climate change by looking at people all over the globe.

The present findings on climate change skepticism are arguably more worrisome than research on daily temperature biases. The effect of recent weather on climate change attitudes disappears after about 10–12 days (Egan and Mullin, 2012). The effect of local climate apparently does not. Likewise, seasonal variation in perceptions of global warming are not nearly as short-lived as responses to one particularly warm or cold week of weather. Advocates of inconvenient actions that could make the earth more habitable for future generations must consider local climate itself a potential impediment when it comes to changing public opinion about climate change (Weber, 2011).

But there are reasons for optimism. It is possible to take advantage of biases in the way people process information – to craft arguments about climate change that are likely to be maximally effective. Consider shared reality theory (Hardin and Higgins, 1996). Like a great deal of classic work in social influence, research on shared reality theory suggests that people are *extremely* sensitive to information about social consensus. Learning that everyone (or virtually everyone) accepts a norm or judgment has a much more powerful effect on persuasion and compliance than learning that a decided majority accepts the same norm or judgment (see also Asch, 1955). There is something very powerful about consensus. It should thus come as no surprise that a very powerful way to convince people of the reality of climate change is to inform people that there is a great deal of scientific consensus on the reality of climate change (van der Linden et al., 2015b). Likewise, capitalizing on the power of social consensus is a very good way to ameliorate a wide variety of other social problems, from stereotypes to public health risks (Sechrist and Stangor, 2001; van der Linden et al., 2015a). In short, getting the public to accept and act on the realities of climate change may require climate change educators and policy-makers to better understand the nature of human social cognition and motivation. If people are inherently egocentric and hyper-social creatures, we cannot easily change these evolved neural and social realities. But we can try to capitalize on them in our efforts to avert future global climatic disasters.

References

Akerlof, K., Maibach, E.W., Fitzgerald, D., Cedenoe, A.Y., Neumane, A., 2013. Do people "personally experience" global warming, and if so how, and does it matter? Global Environ. Change 23, 81–91.

Asch, S.E., 1955. Opinions and social pressure. Sci. Am. 193, 31–35. https://doi.org/10.1038/scientificamerican1155-31.

Balcetis, E., Dunning, D., 2006. See what you want to see: the impact of motivational states on visual perception. J. Pers. Soc. Psychol. 91, 612–625.

Bargh, J.A., Lombardi, W.J., Higgins, E.T., 1988. Automaticity of chronically accessible constructs in person x situation effects on person perception: It's just a matter of time. J. Pers. Soc. Psychol. 55, 599–605.

Barr, S., Prillwitz, J., 2011. Green travelers? Exploring the spatial context of sustainable mobility styles. Appl. Geogr. 32, 798–809.

Davenport, C., 2017. E.P.A. Head Stacks Agency with Climate Change Skeptics. Retrieved March 17, 2017 from. The New York Times. https://www.nytimes.com/2017/03/07/us/politics/scott-pruitt-environmental-protection-agency.html?_r=0.

Earley, P.C., 1993. East meets west meets mideast: further exploration of collectivistic and individualistic work groups. Acad. Manage. J. 36, 319–348.

Egan, P.J., Mullin, M., 2012. Turning personal experience into political attitudes: the effect of local weather on Americans' perceptions about global warming. J. Polit. 74, 796–809.

Epley, N., Keysar, B., Van Boven, L., Gilovich, T., 2004. Perspective taking as egocentric anchoring and adjustment. J. Pers. Soc. Psychol. 87, 327–339.

Fein, S., Spencer, S.J., 1997. Prejudice as self-image maintenance: affirming the self through derogating others. J. Pers. Soc. Psychol. 73, 31–44.

Fincher, C.L., Thornhill, R., Murray, D.R., Schaller, M., 2008. Pathogen prevalence predicts human cross-cultural variability in individualism / collectivism. Proc. R. Soc. B: Biol. Sci. 275, 1279–1285.

Gilbert, D.T., 1991. How mental systems believe. Am. Psychol. 46 (2), 107–119.

Hardin, C.D., Higgins, E.T., 1996. Shared reality: how social verification makes the subjective objective. In: In: Higgins, E.T., Sorrentino, R.M. (Eds.), Handbook of Motivation and Cognition: The Interpersonal Context Vol. 3 Guilford Press, New York pp. 28–84.

Hastorf, A.H., Cantril, H., 1954. They saw a game: a case study. J. Abnorm. Soc. Psychol. 49, 129–134.

Herring, H., 2006. Energy efficiency—a critical review. Energy 31, 10–20.

Hetts, J.J., Sakuma, M., Pelham, B.W., 1999. Two-roads to positive regard: implicit and explicit self-evaluation and culture. J. Exp. Soc. Psychol. 35, 512–559.

Hofstede, G.H., Hofstede, G.J., Minkov, 2010. Cultures and Organizations: Software of the Mind: Intercultural Cooperation and Its Consequences for Survival, 3rd ed. McGraw-Hill, New York.

Holland, G., Bruyère, C.L., 2014. Recent intense hurricane response to global climate change. Clim. Dyn. 42, 617–627. https://doi.org/10.1007/s00382-013-1713-0.

Howe, P.D., Leiserowitz, A., 2013. Who remembers a hot summer or a cold winter? The asymmetric effect of beliefs about global warming on perceptions of local climate conditions in the U.S. Glob. Environ. Change 23, 1488–1500. https://doi.org/10.1016/j.gloenvcha.2013.09.014.

Joireman, J., Truelove, H.B., Duell, B., 2010. Effect of outdoor temperature, heat primes and anchoring on belief in global warming. J. Environ. Psychol. 30, 358–367. https://doi.org/10.1016/J.Jenvp.2010.03.004.

Jones, J.M., 2011. Number of Solidly Democratic States Cut in Half from' 08 to' 10. Retrieved March 11, 2017 from. http://www.gallup.com/poll/146234/number-solidly-democratic-states-cut-half.aspx.

Jones, J.M., 2014. In U.S., Most Do Not See Global Warming as Serious Threat. Retrieved March 2, 2017 from. http://www.gallup.com/poll/167879/not-global-warming-serious-threat.aspx.

Jones, J.T., Pelham, B.W., Mirenberg, M.C., Hetts, J.J., 2002. Name letter preferences are not merely mere exposure: implicit egotism as self-regulation. J. Exp. Soc. Psychol. 38, 170–177.

Jones, J.K., Pelham, B.W., Carvallo, M.R., Mirenberg, M.C., 2004. How do I love thee? Let me count the Js: implicit egotism and interpersonal attraction. J. Pers. Soc. Psychol. 87, 665–683.

Kantenbacher, J., Hanna, P., Cohen, S., Miller, G., Scarles, C., 2018. Public attitudes about climate policy options for aviation. Environ. Sci. Policy 81, 46–53. https://doi.org/10.1016/j.envsci.2017.12.012.

Kempton, W., Boster, J.S., Hartley, J.A., 1996. Environmental Values in American Culture. MIT Press.

Krosnick, J.A., 2013. Opinions in the states. Stanford Political Psychology Research Group. Retrieved March 1,2017 from. http://climatepublicopinion.stanford.edu/sample-page/opinions-in-the-states/.

Krosnick, J.A., Holbrook, A.L., Visser, P.S., 2000. The impact of the fall 1997 debate about global warming on American public opinion. Public Underst. Sci. 9, 239–260.

Kruger, J., Burrus, J., 2004. Egocentrism and focalism in unrealistic optimism (and pessimism). J. Exp. Soc. Psychol. 40, 332–340.

Lambeck, K., Rouby, H., Purcell, A., Sun, Y., Sambridge, M., 2014. Sea level and global ice volumes from the last glacial maximum to the Holocene. Proc. Natl. Acad. Sci. U. S. A. 111, 15296–15303.

Lazer, D., Kennedy, R., King, G., Vespignani, A., 2014. The parable of google flu: traps in big data analysis. Science 343, 1203–1205.

Lee, T.M., Markowitz, E.M., Howe, P.D., Ko, C.-Y., Leiserowitz, A., 2015. Predictors of public climate change awareness and risk perception around the world. Nat. Clim. Change 5, 1014–1020. https://doi.org/10.1038/NCLIMATE2728.

Markus, H.R., Kitayama, S., 1991. Culture and the self: implications for cognition, emotion, and motivation. Psychol. Rev. 98, 224–253. https://doi.org/10.1037/0033-295X.98.2.224.

McCright, A.M., Dunlap, R.E., 2011. The politicization of climate change and polarization in the American public's view of global warming. Sociol. Q. 52, 155–194.

Niles, M.T., Mueller, N.D., 2016. Farmer perceptions of climate change: associations with observed temperature and precipitation trends, irrigation, and climate beliefs. Glob. Environ. Change 39, 133–142.

Oreskes, N., 2004. The scientific consensus on climate change. Science 306, 1686. https://doi.org/10.1126/science.1103618.

Parks, C.D., Vu, A.D., 1994. Social dilemma behavior of individuals from highly individualist and collectivist cultures. J. Confl. Resolut. 38, 708–718.

Pelham, B.W., 2009. Awareness, Opinions About Global Warming Vary Worldwide. Retrieved March 1, 2017 from. http://www.gallup.com/poll/117772/awareness-opinions-global-warming-vary-worldwide.aspx.

Pelham, B.W., Hardin, C.D., Murray, D., Shimizu, M., Vandello, J., 2018. Patterns of Individualism and Collectivism across the Globe. Under review. .

Pew Research Center for the People and the Press (Pew), 2012. More Say there is Solid Evidence of Global Warming. Retrieved February 28, 2017. http://www.peoplepress.org/2012/10/15/more-say-there-is-solid-evidence-of-global-warming/.

Piaget, J., Inhelder, B., 1956. The Child's Conception of Space. Routledge & Kegan Paul, London.

Probst, T.M., Carnevale, P.J., Triandis, H.C., 1999. Cultural values in intergroup and single-group social dilemmas. Organi. Behav. Hum. Decis. Processes 77, 171–191.

Pronin, E., Olivola, C.Y., 2006. Egocentrism. In: In: Salkind, N.J. (Ed.), Encyclopedia of Human Development, vol. 1. pp. 441–442.

Risen, J.L., Critcher, C., 2011. Visceral fit: while in a visceral state, associated states of the world seem more likely. J. Pers. Soc. Psychol. 100, 777–793.

Ross, L., Greene, D., House, P., 1977. The "false consensus effect": an egocentric bias in social perception and attribution processes. J. Exp. Soc. Psychol. 13 (3), 279–301. https://doi.org/10.1016/0022-1031(77)90049-X.

Sacchi, S., Riva, P., Aceto, A., 2016. Myopic about climate change: cognitive style, psychological distance, and environmentalism. J. Exp. Soc. Psychol. 65, 68–73. https://

doi.org/10.1016/j.jesp.2016.03.006.
Schuldt, J.P., Roh, S., 2014. Of accessibility and applicability: how heat-related cues affect belief in “global warming” versus “climate change”. Soc. Cognit. 32, 217–238.
Sechrist, G.B., Stangor, C., 2001. Perceived consensus influences intergroup behavior and stereotype accessibility. J. Pers. Soc. Psychol. 80, 645–654.
Solomon, S., Plattner, G.K., Knutti, R., Friedlingstein, P., 2009. Irreversible climate change due to carbon dioxide emissions. Proc. Natl. Acad. Sci. U. S. A. 106, 1704–1709. https://doi.org/10.1073/ pnas.0812721106.
Solomon, S., Greenberg, J., Pyszczynski, T., 2015. The Worm at the core: On the Role of Death in Life. Random House.
Stearns, S.C., 1992. The Evolution of Life Histories. Oxford University Press., Oxford.
Stephens-Davidowitz, S., 2014. The cost of racial animus on a black candidate: evidence using Google search data. J. Public Econ. 118, 26–40.
Stone, M. (2018, Feb. 7). Now Scott Pruitt thinks climate change could be good. Earther. Retrieved May 21, 2018 from https://earther.com.
Swann Jr., W.B., 1987. Identity negotiation: where two roads meet. J. Pers. Soc. Psychol. 53, 1038–1051.
Tooby, J., Cosmides, L., 2015. The theoretical foundations of evolutionary psychology. In: 2nd ed. In: Buss, D.M. (Ed.), The Handbook of Evolutionary Psychology, vol. 1 John Wiley & Sons, Hoboken, NJ Foundations, (pp. 3–87).
Tversky, A., Kahneman, D., 1973. Availability: a heuristic for judging frequency and probability. Cognit. Psychol. 5, 207–232. https://doi.org/10.1016/0010-0285(73)90033-9.
Van de Vliert, E., 2013a. Climato-economic habitats support patterns of human needs, stresses, and freedoms. Behav. Brain Sci. 36, 465–480.
Van de Vliert, E., 2013b. White, gray, and black domains of cultural adaptations to climato-economic conditions. Behav. Brain Sci. 36, 503-521.
van der Linden, S., Clarke, C., Maibach, E., 2015a. Highlighting consensus among medical scientists increases public support for vaccines. BMC Public Health 15, 1207. https://doi.org/10.1186/s12889-015-2541-4.
van der Linden, S., Leiserowitz, A., Feinberg, G., Maibach, E., 2015b. The scientific consensus on climate change as a gateway belief: experimental evidence. PLoS One 10 (2). https://doi.org/10.1371/journal.pone.0118489. e0118489.
van der Linden, S., Maibach, E., Leiserowitz, 2015c. Improving public engagement with climate change: Five “best practice” insights from psychological science. Perspect. Psychol. Sci. 10, 758–763.
Vandello, J., Cohen, D., 1999. Patterns of individualism and collectivism across the United States. J. Pers. Soc. Psychol. 77, 279–292.
von Hippel, W., Trivers, R., 2011. The evolution and psychology of self-deception. Behav. Brain Sci. 34, 1–16. https://doi.org/10.1017/S0140525X10001354.
Wason, P.C., 1960. On the failure to eliminate hypotheses in a conceptual task. Q. J. Exp. Psychol. 12, 129–140. https://doi.org/10.1080/17470216008416717.
Weber, E.U., 2011. Psychology: climate change hits home. Nat. Clim. Change 1, 25–26. https://doi.org/10.1038/nclimate1070.
Williams, L.E., Bargh, J.A., 2008. Experiencing physical warmth promotes interpersonal warmth. Science 322, 606–607. https://doi.org/10.1126/science.1162548.
Wilson, T.D., Wheatley, T., Meyers, J.M., Gilbert, D.T., Axsom, D., 2000. Focalism: a source of durability bias in affective forecasting. J. Pers. Soc. Psychol. 78, 821–836.
Zaval, L., Keenan, E., Weber, E.U., Johnson, E.J., 2014. How warm days increase belief in global warming. Nat.: Clim. Change 4, 143–147.